Evaluation of host partial resistance efficacy to a foliar disease using a simulation modeling approach : case of *Mycosphaerella* leaf spots diseases of banana.

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Black leaf streak disease (BLSD) due to the ascomycete *Mycosphaerella fijiensis* is considered as the most destructive foliar disease of bananas. It has just invaded the French Indies banana production area. The current control strategy requires frequent aerial fungicide applications on intensive production plots because of the cultivation of high-yield but BLSD susceptible varieties. The use of resistant varieties appears as the most durable and appropriate control. As none commercial resistant varieties are available for producers, CIRAD has set up a banana breeding program to create BLSD resistant varieties.

As the evaluation of BLSD resistance efficacy of new hybrids created by CIRAD is both time- and space-consuming, a disease simulation model has been developed. It will allow to select resistant hybrids and to identify efficient resistance components.

The model SiBatoKa is a mechanistic and discrete simulation model of *Mycosphaerella* leaf spot~~s~~ diseases. It describes, at a banana plant scale, the establishment and development of BLSD epidemics under optimal climatic conditions during several banana cycles (two years).

It is built into two sub-models describing (i) the banana growth and (ii) the epidemics development. The banana-sub model simulating leaves growth is determinist. The disease-sub model simulates the complete infectious cycle including spore dispersal (at plant scale), the creation of lesions, their growth and the asexual and sexual sporulation stages.

Available data on lesions (counts and surface) and sporulation collected under natural and artificial were used to calibrate the model. Parameters of the disease-sub-model are estimated with a Bayesian approach using the MCMC (Markov Chain of Monte Carlo) technics. Then a posteriori distributions of all parameters and residual variance are obtained. The inference of parameters and the results from the first simulations will be presented and discussed.

Key-words :*Mycosphaerella* sp., banana, foliar disease, simulation model, bayesian parameter estimation